

Description

The invention relates to a floor cleaning device having a brush chamber constructed in a base housing, according to
5 the pre-characterising clause of Claim 1.

In a known floor cleaning device of this type, the brush cylinder is driven by rollers by way of a friction wheel, as a result of which the brush cylinder changes its
10 direction of rotation depending on the operating direction. Dirt picked up by the rotating brush cylinder is swept into a dirt collecting chamber which is arranged upstream or downstream of the brush cylinder, depending on the operating direction. To empty the dirt collecting chambers,
15 it is necessary to pick up the entire floor cleaning device and to empty the respective dirt collecting chamber by opening corresponding flaps. This is very laborious and often results in only partial emptying so that pieces of dirt remaining in the dirt collecting chamber restrict the
20 natural capacity of the floor cleaning device; there is furthermore a risk that swept-up particles of dirt will fall out during transportation between one area of use and another and cause surfaces which have just been cleaned to become dirty again.

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The object on which the invention is based is to further develop a floor cleaning device of the generic type in such a way as to ensure that dirt is picked up reliably on the one hand and the dirt collecting container is emptied
30 easily and completely on the other.

According to the invention, the object is achieved according to the characterising features of Claim 1.

The construction of the floor cleaning device, which comprises a base housing having the cleaning tool and a removable dirt collecting container which is constructed
5 separately therefrom, ensures simple emptying of the dirt collecting container. The sweeping ramp projecting from the dirt collecting container into the region of the circular path of the bristles of the brush cylinder ensures that even troublesome, large particles of dirt are picked up
10 completely and easily and conveyed into the dirt collecting container.

The sweeping ramp preferably rises in the direction of the dirt collecting container, thus enabling the construction
15 of a step which delimits the dirt collecting container with respect to the rotating brush cylinder or the brush chamber. Dirt which has been picked up can no longer reach the working region of the brush cylinder and is reliably retained - even when the floor cleaning device is lifted
20 off the floor surface to be cleaned.

Due to the fact that it is possible for the base housing to effect a relative movement with respect to the container housing within a small angular range about an axis which is
25 approximately parallel to the axis of rotation of the brush cylinder, the floor cleaning device is also readily able to follow irregularities in the floor, for example bulges in the carpet and the like. As a result of this, it is also particularly possible to sweep up large pieces of dirt such
30 as glass splinters, building stones or the like; the brush cylinder climbs over the large piece of dirt and conveys it into the dirt collecting container via the sweeping ramp. So that the dirt is collected reliably over the entire

width of the brush cylinder, it is furthermore provided for the base housing to be movable about a tilting axis located transversely to the pivot axis, that is to say the base housing can execute oscillating movements relative to the container housing. When climbing over large pieces of dirt, only part of the brush cylinder will lift off the floor, whilst the remaining region continues to rest at least partly on the floor surface to be cleaned. In order to ensure that the brush cylinder is guided back reliably onto the floor surface to be cleaned, the motor is furthermore arranged above the brush cylinder, preferably above its axis of rotation. The weight of the motor therefore acts as a resetting force. The pivot axis is preferably located between the brush cylinder and a rear support of the container housing on the floor, which is why the front edge of the sweeping ramp, which delimits the dirt intake slot, lies flat on the floor surface to be cleaned, in the manner of a shovel.

20 If the suction cleaning slot extends from the underside - facing the floor surface - of the base housing into the front end wall of the base housing, as seen in the operating direction, then it is not only easily possible to ensure that a floor surface is cleaned right into the corner region of the rising wall using the floor cleaning device according to the invention, but also to ensure that large pieces of dirt are not pushed in front of the device but are collected by the rotating brush cylinder and swept up. To this end, the bristles project over the front end wall.

In order to also reliably prevent dirt from escaping when the floor cleaning device is lifted off the floor, it is

provided for the pivot axis of the stirrup-shaped holding device to be arranged on that side of the overall centre of gravity of the floor cleaning device which faces the base housing. If the floor cleaning device is lifted off the floor at the guiding handle, the entire housing in the stirrup-shaped holding device will pivot about the pivot axis in such a way that the base housing faces the guiding handle, that is to say the intake opening of the dirt collecting container is remote from the floor.

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Further features of the invention are revealed in the further claims, the description and the drawing in which there follows an illustration of an exemplary embodiment of the invention which is described in detail. There is shown:

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Fig. 1 a perspective view of the floor cleaning device according to the invention;

Fig. 2 a section through the floor cleaning device according to Fig. 1;

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Fig. 3 a view from below of the base housing of the floor cleaning device according to Fig. 1;

Fig. 4 a view from behind of the base housing of the floor cleaning device according to Fig. 1;

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Fig. 5 a view from below of the container housing;

Fig. 6 a perspective view of the container housing with the dirt collecting container constructed therein.

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The floor cleaning device 6 shown in the exemplary embodiment comprises a base housing 1, located at the front as seen in the operating direction 5, and an independent container housing 2, which is connected to the base housing 1 and can be separated from the base housing 1.

The base housing 1 (which is shown separated in Figs. 3 and 4) extends substantially transversely to the operating direction 5 over the entire width of the container housing 2 (Fig. 1). Constructed in the base housing 1, there is a brush chamber 10 which is substantially open towards the floor surface 7. Constructed above the brush chamber 10, there is a motor chamber 12 which - as shown in Fig. 1 - is of a narrower construction than the brush chamber 10. Arranged in the motor chamber 12, there is a drive motor 8 which, in the exemplary embodiment shown, is an electric motor whereof the speed is preferably controlled according to the load. The electric motor can be supplied by way of a mains cable of a wiring system or by way of a rechargeable battery which should preferably be arranged in the motor chamber 12. Other drive motors, for example air turbines or the like are also essentially possible, the air turbines being driven by the suction air flow of a vacuum cleaner. The drive motor 8 drives a brush cylinder 13 arranged in the brush chamber 10 by way of a belt 9, which can be constructed as a flat or a toothed belt. A gear drive or a friction-wheel drive, which can have one or more intermediate wheels as required, can also be expedient. The brush cylinder 13 extends transversely to the operating direction 5 over the entire width of the brush chamber 10 and is rotatably mounted in the side cheeks 14 of the brush chamber 10. Bearing bushes 15, which can be constructed as plastic bushes or slide-bearing

bushes, are preferably pressed into the side cheeks 14. Owing to a resilient bending of the plastic side cheeks 14, the brush can simply be released from its bearings and removed from the brush chamber 10 for cleaning.

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Constructed on the rear side 16 (Fig. 4) - facing the container housing 2 - of the base housing 1, there is a U-shaped wall 17 which faces the floor surface 7 with the open side of the U (Fig. 2). The side walls 18 of the U-shaped wall 17 extend partly parallel to the side cheeks 14 of the base housing 1 and the brush chamber 10 at a spacing a. The middle web 19 of the U-shaped wall 17, which spans the brush chamber 10, is curved about an axis 40 which is determined by a respective bearing opening 41 in the side walls 18 of the wall 17. The bearing opening 41 is located approximately on a level with the axis of rotation of the brush cylinder 13 in that region of the side walls 18 which is remote from the brush chamber 10. The bearing openings 41 serve to engage with the bent end portions 42 of a stirrup-shaped holding device 4 arranged at the end of a guiding handle 3, which is advantageously constructed as a telescopic rod and is intended for guiding the floor cleaning device 6.

25 The domed wall 17 reaches into the container housing 2, which substantially forms a dirt collecting container 20. As can be seen in connection with Fig. 5, a longitudinal slot 22 is constructed in each of the side walls 21 of the container housing 2 and is used to push the container housing 2 onto the end portions 42 of the stirrup-shaped holding device 4, which are located in the bearing openings 41. Here, the front side wall portions 21a move into the space 31 formed between a side cheek 14 of the base

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housing 1 and the side wall 18 of the domed wall 17 (Figs. 3, 4).

The intake opening 23 of the container housing 2, which is substantially in the form of a sweeping ramp closed along five sides, is located in a plane 24 (Fig. 2) situated remote from the floor surface 7 at an angle 25 of less than 90° with respect to the floor surface 7. As a result of this design, the front end portions 21a are located upstream of the upper longitudinal edge 26, as seen in the operating direction 5, which is why the wall portions 21a reach well below the base housing 1, whilst the upper edge 26 of the intake opening 23 is located in the region of the middle web 19 of the wall 17. The wall portion 27 adjoining the longitudinal edge 26 of the intake opening 23 of the container housing 2 is constructed such that it is rounded about the pivot axis 40 to correspond with the middle web 19 of the wall 17. The end portions 42 of the stirrup-shaped holding device 4 are located in the longitudinal slots 22 which are open towards the base housing 1, so that the container housing can move about the pivot axis 40 relative to the base housing 1 due to the construction of the wall 17 and the wall portion 27. In order to create a reliable, releasable connection between the base housing 1 and the container housing 2, rapid-release closures 99 comprising spring-loaded latching clips 28 are arranged on the outsides of the side walls 21 of the container housing 2, said latching clips each reaching over the end portion 42 of the stirrup-shaped holding device 4 with their latching opening 29 so that the end portion 42 is held in the longitudinal direction of the longitudinal slots 22 in such a way that it cannot come free. The latching clips 28 can easily be opened in opposition to the

spring force enabling the container housing 2 to be pulled away quickly and easily from the end portions 42 of the stirrup-shaped holding device 4 and the domed wall 17 without the use of tools.

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Between the front side wall portions 21a, the container housing 2 has a sweeping ramp 30 having a front edge 32 located transversely to the operating direction 5 and reaching as far as the circular path 33 of the bristles 34 of the brush cylinder 13 - c.f. Fig. 2. The sweeping ramp 30 thus leads out of the region of the brush chamber 10 to the dirt collecting container 20, preferably rising at an angle 35 in the direction of the dirt collecting container 20. The sweeping ramp 30 is preferably approximately at a tangent to the circular path 33 of the bristles 34 of the brush cylinder 13.

The sweeping ramp 30 ends at a step 36, which delimits the dirt collecting container 20 and by way of which swept-up dirt falls into the dirt collecting container 20 and is reliably retained there. The step 36 therefore delimits the dirt collecting container 20 in the direction of the base housing 1.

Owing to the chosen design of the base housing 1 and the container housing 2, the brush chamber 10 is connected to the dirt collecting container 20 by way of a connecting channel 37 which is delimited on the one hand by the U-shaped wall 17 and on the other hand by the sweeping ramp 30. This design ensures a close spatial proximity between the brush chamber 10 or the brush cylinder 13 and the dirt collecting container 20.

The dirt intake slot 11 of the brush chamber 10, which faces the floor surface 7, is therefore delimited on the one hand by the front edge 32 of the sweeping ramp 30 and on the other hand by a housing edge 38a of the brush chamber 10, which extends transversely to the operating direction 5. In the exemplary embodiment shown, the suction cleaning slot 11 extends from the underside 39 - facing the floor surface 7 - of the base housing 1 into the front end wall 38 of the base housing 1 (as seen in the operating direction 5). The bristles 34 of the brush cylinder 13 protrude from this dirt intake slot 11, that is to say they project over the front end wall 38 just as they project over the underside 39 of the floor cleaning device. This enables both good cleaning of the floor surface 7 and also end-face cleaning of the corners of a room. In the construction shown, the dirt intake slot 11 is located in a plane 48, which is determined by the front edge 32 of the sweeping ramp 30 and the housing edge 38a and forms an angle 49 of preferably approximately 45° or less with the floor surface 7.

To support the floor cleaning device on the floor surface 7, rollers 45 are arranged in the underside 46 - facing the floor surface 7 - of the container housing 2. As Fig. 6 shows, the rollers 45 are located on the end portion 44 of the container housing 2, which is remote from the base housing 1, so that the floor cleaning device is supported on the one hand by the bristles 34 being supported on the floor surface 7 and on the other hand by the rollers 45 arranged at the rear end of the floor cleaning device in the base of the container housing 2. Each roller 45 is mounted on a support 55 which is rotatable about a vertical axis 56, the support 55 being

set in a cup-shaped receiving means 57. The support is rotatable through 360°; a roller 45 mounted in this manner is also known as a pirouette wheel.

5 In order to ensure that the dirt collected in the dirt collecting container 20 is not inadvertently emptied by way of the connecting channel 37 and the brush chamber 10 when the floor cleaning device is lifted off the floor, the pivot axis 40 of the stirrup-shaped holding device 4 is
10 arranged on that side of the overall centre of gravity 47 of the floor cleaning device 6 which faces the base housing 1.

In order to prevent an accumulation of air or an air vortex
15 in the dirt collecting container 20 from hindering dirt from being picked up, ventilation slots 50 are arranged on either side of a handle 51 on the upper side of the container housing 2, which is remote from the floor surface 7. To supply or remove cool air for the drive
20 motor 8, corresponding ventilation slots 43 are provided in the sheathing of the motor chamber 12.

Owing to the described construction, it is also possible for large pieces of dirt, building stones, shards of glass
25 or the like to be swept up reliably by the floor cleaning device. The device, which is supported on the floor surface 7 by the brush cylinder 13 and the rollers 45, tips at the level of the pivot axis 40 until the front edge 32 of the sweeping ramp 30 rests on the floor surface 7. If a
30 large piece of dirt lying in front of the base housing 1 (as seen in the operating direction 5) is to be picked up, the bristles 34 of the brush cylinder 13, which project over the front end wall 38, firstly collect the large piece

of dirt and climb onto the large piece of dirt due to the brush cylinder 13 revolving in the direction of the sweeping ramp 30 in the direction of the arrow 13b. The upward movement necessary for this is possible as a result of the relative movement between the base housing 1 standing on the floor surface 7 and the container housing 2 standing on the floor surface 7, this relative movement being permitted within a large angle 100. During this, the base housing 1 pivots upwards about the axis 40 in the direction of the arrow 140. If the large piece of dirt is only collected in an end region of the brush cylinder 13, the base housing 1 pivots about the axis 40 and simultaneously tilts in the direction of the arrow 140' about a tilting axis 40' located transversely to the pivot axis 40. This tilting movement is possible as a result of the end portions 42 being appropriately mounted in the bearing openings 41. Once the brush cylinder 13 has passed over the large piece of dirt, it is reliably swept up - even when the operating direction 5 is reversed. The arrangement of the motor 8 approximately above the axis of rotation 13a of the brush cylinder 13 and the arrangement of a battery which can possibly be provided in the motor chamber 12 also contribute here. The weight of this places a load on the brush cylinder 13 in its starting position and therefore produces a resetting force.

Claims

1. A floor cleaning device having a brush chamber (10) which is constructed in a base housing (1) and has a dirt
5 intake slot (11) facing the floor surface (7) to be cleaned and extending transversely to an operating direction (5) over the width of the brush chamber (10), having a brush cylinder (13) which is rotatably mounted in the brush chamber (10), is driven by a motor (8) and whereof the
10 bristles (34) project outwards through the dirt intake slot (11), and having a dirt collecting container (20) connected to the brush chamber (10) by way of a connecting channel (37), characterised in that the dirt collecting container (20) is connected directly to the base
15 housing (1) and is constructed in an independent container housing (2) which can be separated from the base housing (1), the container housing (2) having a sweeping ramp (30) which leads to the dirt collecting container (20) and whereof the front edge (32), which is remote from the
20 dirt collecting container (20) and is located transversely to the operating direction (5), is approximately on a level with the circular path (33) of the bristles (34) of the brush cylinder (13).
- 25 2. A floor cleaning device according to Claim 1, characterised in that the sweeping ramp (30) rises in the direction of the dirt collecting container (20), preferably approximately at a tangent to the circular path (33) of the bristles (34) of the brush cylinder (13).
- 30 3. A floor cleaning device according to Claim 1 or 2, characterised in that the sweeping ramp (30) ends at a step (36) delimiting the dirt collecting container (20).

4. A floor cleaning device according to one of Claims 1 to 3, characterised in that the front edge (32) of the sweeping ramp (30) delimits the dirt intake slot (11).

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5. A floor cleaning device according to one of Claims 1 to 4, characterised in that the base housing (1) can be pivoted upwards through an angle (100) relative to the container housing (2) about an axis (40) which is
10 approximately parallel to the axis of rotation of the brush cylinder (13).

6. A floor cleaning device according to Claim 5, characterised in that the pivot axis (40) is located
15 between the brush cylinder (13) and a further support of the container housing (2) on the floor.

7. A floor cleaning device according to Claim 5 or 6, characterised in that the base housing (1) can be moved
20 relative to the container housing (2) about a tilting axis (40') located transversely to the pivot axis (40).

8. A floor cleaning device according to one of Claims 1 to 7, characterised in that the motor (8) is located above
25 the brush cylinder (13) and in the vicinity of its axis of rotation (13a), preferably above its axis of rotation (13a).

9. A floor cleaning device according to one of Claims 5 to 8, characterised in that the pivot axis (40) is formed
30 by a stirrup-shaped holding device (4) of a guiding handle (3), which reaches over the base housing (1).

10. A floor cleaning device according to Claim 9,
characterised in that the pivot axis (40) of the stirrup-
shaped holding device (4) is located on that side of the
overall centre of gravity (47) of the floor cleaning
5 device (6) which faces the base housing (1).

11. A floor cleaning device according to one of Claims 1
to 10, characterised in that the suction cleaning slot (11)
extends from the underside (46) of the base housing, which
10 faces the floor surface (7), to the front end wall (38) of
the base housing (1) as seen in the operating
direction (5).

12. A floor cleaning device according to Claim 11,
15 characterised in that the bristles (34) of the brush
cylinder (13) protrude over the plane of the front end
wall (38).

13. A floor cleaning device according to Claim 11 or 12,
20 characterised in that the longitudinal housing edges
(32, 38a) delimiting the dirt intake slot (11) are located
in a plane (48) which forms an angle (49) of preferably
approximately 45° with the floor surface (7) to be cleaned.

25 14. A floor cleaning device according to one of Claims 1
to 13, characterised in that the connecting channel (37) is
delimited on the one hand by the sweeping ramp (30) and on
the other hand by the base housing (1).

30 15. A floor cleaning device according to one of Claims 1
to 14, characterised in that the container housing (2)
reaches partly over the base housing (1).

16. A floor cleaning device according to one of Claims 1 to 15, characterised in that rollers (45) are arranged on the underside (46) - facing the floor surface (7) - of the container housing (1), preferably in the end portion (44) of the container housing (2), which is remote from the base housing (1).

17. A floor cleaning device according to one of Claims 1 to 16, characterised in that air-outlet slots (50) are arranged in the dirt collecting container (20).

18. A floor cleaning device according to one of Claims 1 to 17, characterised in that the container housing (2) can be fixed to the base housing (1) by rapid-release closures (9).

Attached: 5 pages of drawings